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Content	Mailroom Date	Entry Number	IDS Review	Last Modified	Reviewer
M844	2005-06-03	18	Y ☑	2005-06-13 16:15:49.0	ccofer
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?Wheelchex? Guardian of the Infrastructure or Aid to Maintenance? [slides]

by M Conn, GNER, UK

This presentation gives a brief background of "Wheelchex" and describes how it is utilised by Network Rail and how GNER react.

T S2/3,KWIC/1-2

2/3,KWIC/1 (Item 1 from file: 63)
DIALOG(R)File 63:Transport Res(TRIS)

00037811 DA
TITLE: THE 2,000 HP DIESEL LOCOMOTIVE OF THE GERMAN FEDERAL
AUTHOR(S): Lampe, C; Gossl, N
CORPORATE SOURCE: Carl Rohrig Verlag, Darmstadt, West German
JOURNAL: Railway Technical Review Pag: pp 2-16
PUBLICATION DATE: 19551000 PUBLICATION YEAR: 1955
LANGUAGE: English SUBFILE: RRIS; RRIS (R 73S1; R 76
FIGURES: 13 Fig TABLES: 2 Tab
REFERENCES: 6 Ref PHOTOS: 6 Phot

PUBLICATION DATE: 19551000
DESCRIPTORS: GERMAN TECHNOLOGY; LOCOMOTIVES; DIESEL LOCOMOTI
MAINTENANCE; VEHICLE DESIGN; LOCOMOTIVE DESIGN; TRANSM
RAIL DYNAMICS; TRUCKS; TRUCK DESIGN; SPECIFICATION; DIM

2/3,KWIC/2 (Item 1 from file: 96)
DIALOG(R)File 96:FLUIDEX

00236808 FLUIDEX NO: 0246314 SUBFILE: FP
Proportional hydraulics on the railways
IDRAULICA PROPORZIONALE IN FERROVIA
Fluid, Vol. 30, No. 312/A, Apr., 1990, p.209., 1990
DOCUMENT AVAILABLE: YES
ISSN: 0374-3225
RECORD TYPE: ABSTRACT
LANGUAGES: Italian

PUBLICATION DATE: 19900000

Jackson Jordan Inc. offers an autonomous automatic hydraulic maintenance vehicle. The locomotive size computerised sy grinding wheel control circuits with axial piston reversib capacity 110 l/ min., and with proportional control...
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S1          2   PD<=020531 AND ((TRAIN OR LOCOMOTIVE) (7N) W
             ZE OR DIMENSION OR RADI?)
S2          2   RD  (unique items)
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Do you know where your locomotive is? And what condition it's in? And if your rolling stock is healthy? It's taken quite some time for advanced fault detection systems to catch on, but more railroads are testing the waters.

From: Railway Age | Date: October 1, 2003 | Author: Luczak, Marybeth

Magazines

Most of us wouldn't dare drive our SUVs without auto insurance. So doesn't it make sense that railroads and private-car owners take out similar policies on their most precious commodities--1.6 million cars and locomotives worth more than $60 billion? Consider these stats from the Association of American Railroads:

* High impact wheels cause more than 14,000 unplanned train stops on North American railroads each year at a cost of about $1,000 per wheel or an annual cost of $14 million.

* More than 6,300 hot-bearing train stops each year result in 9,000 hours of delays, at an annual cost of $4.1 million.

* Poorly performing trucks cause about 73 accidents per year, costing North American railroads $27.7 million annually. If railroads were able to identify, these trucks earlier, they could prevent 20% of truck-related derailments, saving $5.3 million per year.

Fault detection products protect rolling stock, track infrastructure, and lading before damage, costly repairs, traffic holdups, and derailments occur. From onboard monitors to wayside technologies, they detect a variety of conditions from wheel wear and overspeed impacts to truck hunting, vertical impacts, and temperature/pressure changes. All data is passed on--often in real time--via telephone, fax, pager or the Internet, allowing railroads, contractors, and customers to act on it quickly. Such information is critical to tracking and monitoring the health of locomotives and sensitive freight such as perishables, finished automobiles, hazardous materials, and wide-and-heavy industrial loads.

Bottom line: While the cost-benefit analysis for each fault detection system varies, there's no doubt that railroads can save more money and time with fault detection systems. They make maintenance more efficient so that cars stay in service longer, there is less material cost and waste, man-hours for vehicle inspection are reduced, and car availability is increased--leading to improved service reliability and, possibly, growth in traffic and revenue.

While fault detection technology has been on the horizon for years, only in the past five have railroads really caught on to its benefits and slowly started to install advanced monitoring devices, according to Firdausi Irani, executive director of performance monitoring systems for Transportation Technology. Center, Inc. "The Class I's understand that detection systems allow them to take proactive steps to reducing forces on equipment and rail infrastructure, which saves money all around."

Prevention is key

"We see fault detection technology as critically important," says Craig Hill, vice president-mechanical

and value engineering for Burlington Northern and Santa Fe. "There are two major disruptions to the railroad: derailments and service interruptions. Our job is to reduce and/or prevent each of them. We've had significant success at reducing derailments, as the mechanical cause is down 55-60%, year over year. The point is that we want to be able to plan maintenance so that we are proactive rather than reactive when something breaks."

Other railroaders agree. "CSX is pushing forward with many initiatives to improve reliability of over-road operations, and our fault detection initiatives play into that," says Greg Martin, chief mechanical officer at CSX Transportation.

Applications

Currently, wayside fault detectors are more pervasive than onboard monitors, as they can read cars from one location. Railroads decide where to install these detectors based on traffic volumes and risk assessment--commodity type, car mileage, and/or track and car condition.

"Our strategic direction is to use more wayside detection technology," says Rex Beck, Union Pacific's director of freight car engineering. "The cost of entry is much more reasonable than equipping every freight car with monitors. We have plans to put together a systemwide network to monitor the health of freight cars running across our tracks. There will be 20 strategic sites to monitor a large percentage of our railcar fleet. We have a good start on it now. We've got hot bearing detectors, which we are upgrading, 13 wheel impact load detectors, one acoustic bearing detector, two truck performance detectors, and a low hose detector."

Onboard fault detection is still a niche, as the economics of putting monitors on every railcar have to be justified, but it's found a home in places where wayside detectors can't reach. "It certainly has an application in the transport of high-value and/or sensitive commodities--like finished automobiles and perishables," says TTCI's Irani.

UP is among the Class I's that implement these systems, most often on refrigerated cars. "We thought it was appropriate because it's one of the biggest opportunities for reduction of claims due to product loss," says UP's Beck, who reports that more than 1,000 UP refrigerated boxcars are now equipped with onboard systems. "Primarily, we use them to prevent the loss of loads, and secondarily, we have the opportunity to save fuel through better asset management," Beck says. The detectors monitor car temperature, generator fuel levels, and location, as well as refrigeration-unit health, among other characteristics. Through two-way satellite communication, the railroad can start and stop the refrigeration unit remotely and perform self-diagnostics to ensure that cars are ready for loading before they reach customers. If there is a temperature loss or if the unit is low on fuel, railroad personnel are automatically alerted through a Web-based alarm, so that the units can be serviced. UP's five year plan includes equipping its entire fleet of about 4,500 refrigerated cars with detectors.

Onboard fault detection on locomotives is another growth area. While some Class I's use such systems as IntelliTrain from General Motors Corp.'s Electro-Motive Division or Expert-On-Alert [TM] from GE Transportation Systems (see below) to transfer data in real time, others download collected data and perform tests manually in the shop during 92-day FRA inspections.

Facing challenges

With every new technology, there are inevitable hurdles that stand in the way of widespread acceptance.

"Unfortunately, it can be difficult to get people to see the value in new technology, when they've lived

without it forever," says Kevin Kesler, director of rail programs for ENSCO.

"Everyone wants to allocate resources based on factual data, which is what real-time operations monitoring provides. What's standing in the way is not more complete and rapid implementation, but planning implementation and operations issues across departments."

According to Norm Bridge, director-control and electrical system design at EMD, problems stem from deparments operating in a vacuum. "Some roads still have transportation people who aren't talking to mechanical people and vice versa," he says. "What we're trying to do with our products is bring them together to solve problems."

Interest in the technology also depends on the length and depth of a railroad's experience with it, and answers to the "who gets the benefits vs. who pays for it" question, points out Tim Slifkin, president of StarTrak LLC.

But suppliers are patient. "Our sense is that the rail industry is such a capital-intensive industry to begin with that there is a fairly slow technology adoption cycle," says Greg Smith, I.D. Systems's marketing manager. "Railroads just can't jump in and spend money to deploy everything. There has to be a critical mass reached, as there has been with the trucking industry. We're confident that for long-term growth, tracking and management of assets in real time will become a more important component of providing the service and just-in-time delivery capabilities that customers demand."

Following are among the fault detection systems that suppliers offer.

Alstom

As part of an "intelligent" maintenance strategy, Alstom provides transit agencies and freight railroads with a variety of fault detection products. The WheelChex system measures wheel loads and the speed of passing trains, sending alarms via modem to railroad personnel when pre-set wheel load thresholds are exceeded. Since ride quality is dependent on the track and vehicle suspension quality, RideMon measures track infrastructure variability and identifies potential suspension problems. This onboard system uses an accelerometer to continuously measure vehicle ride characteristics. Alstom's EngMon is a locomotive engine performance system that monitors such parameters as exhaust temperatures, air pressure, oil pressure and temperature, coolant temperature, and engine speed. This system provides operational information directly from the locomotive to the maintenance department in real time, detailing engine health and operation. VIEW is Alstom's automated wayside inspection and wear analysis system, which includes TreadVIEW (for wheel profile, wheel diameter, wheel flange height and width, and radium measurements), PadVIEW (for brake pad thickness), BlockVIEW (for brake block thickness), and ShoeVIEW (for brake shoe thickness and height). Railroad personnel can analyze individual component measurements and wear rates, identify components that need attention, and monitor the performance of components across the fleet.

EMD

To reduce maintenance costs and improve asset reliability, EMD's fault detection technology includes the automatic and continuous monitoring of a variety of performance parameters.

For many years, data has been stored in locomotive "fault archives," allowing maintenance workers to access it when the equipment reached the shops. With the advent of EMD's IntelliTrain, that data can be retrieved and interpreted in real time through wireless communications.

"Locomotive Fault data has been trying to 'talk' to us for years," says Curt Swenson, director-market

development and communications at EMD. "Now we can 'listen' anytime and all the time--not just get a summary of the conversation at 92-day [service] intervals."

Not only can the system diagnosis what faults mean, it can help predict failures before they occur, making it easier for maintenance employees to identify problems and significantly reduce road failures.

"Our SmartSignal system allows us to create a statistical model for each locomotive and analyze automatically the data that comes off the locomotive and identify deviations from the norm," says EMD's Bridge.

IntelliTrain's TechPro system uses artificial intelligence to guide technicians through troubleshooting and identification of the root causes of archived faults.

In addition, IntelliTrain provides exact locomotive location as well as the ability to remotely shut down and restart individual locomotives on a train. It also provides detailed information about the state of health of all lead, trailing, and distributed units, as well as third-party system health, including HVAC, air brakes, and cab signals. (For more information, see RA, July, p. 34.)

ENSCO

ENSCO originally developed a locomotive health monitoring system for Conrail, but it is now most often marketed as a ride-quality monitoring device, according to Kevin Kesler. The device's onboard computer can monitor location, speed, and direction, as well as component performance in real time, sending the information to railroad personnel and ENSCO's service center using cellular data communication. It provides early warning of undesired vehicle-track interaction, and sends event-driven alerts when specified thresholds are met.

Currently, Amtrak is using the device to monitor acceleration performance and ensure compliance with high speed standards in New Jersey on the Northeast Corridor. "Data is integrated from the wheel force and angle of attack measurements to flag vehicles that are bad actors and provide early warning for maintenance," says Kesler. The system can identify wheel conditions and forces--differentiating between spalled wheels and flats--as well as poor dampers and worn suspension components.

GE Transportation Systems

GE Transportation Systems offers LOCOCOMM [R] , "an integrated onboard computer and communications management system that is coupled with a multi-mode communications antenna package to provide railroads with wireless data transmission from locomotives." Part of this system, Expert-on-Alert" [TM] is designed to reduce locomotive maintenance troubleshooting. A computer management unit (CMU) takes data intelligence from the onboard computer and relays it to off-board diagnostic tools, according to Joseph Cermak, manager of remote monitoring and diagnostics for GETS. For instance, if a locomotive has a low-horsepower issue, GETS's onboard computer sends the pertinent data via satellite to GETS where the supplier is able to look at the data in relation to locomotive operation and make a recommendation on performance. That recommendation is then sent directly into the railroad's computer system.

The system reduces the probability of repeat failure--fixing the problem the first time, notes Michael Anderson, manager of operations at GETS. "About 20-30% of locomotive problems are intermittent in nature, so they are difficult to reproduce in the shop," he says. "That's why this system is so beneficial. It can identify the true root cause in the operating environment."

GETS also offers PinPoint [TM], an integrated GPS tracking and monitoring application. (For more information, see RA, July, p. 34.)

I.D. Systems, Inc.

Because it's expensive to put communication hardware and software on every piece of rolling stock and have ongoing communication via satellite and modem (which can cost millions of dollars a month), I.D. Systems developed an economical onboard asset communicator. It allows each car on a train to communicate with adjacent cars via radio frequency. The data collected from each car aggregates to a head-end unit, where it is bundled and transmitted via cellular modem, according to Greg Smith. "If you've got a 100-car train, you can get realtime information on all 100 cars for the price of one," he says. "Fault detection sensors can be tied in with the asset communicator hardware to send alerts," he adds. "You could put a sensor on a refrigerator car's gen-set to send an alert if it's not operating correctly or set up a link to an electronic door lock for security purposes."

Lat-Lon, Inc.

Lat-Lon's RailRider [TM] wireless monitoring systems cover a variety of faults from human handling (such as overspeed impacts, which are detected by incorporated accelerometers) to mechanics (wheels, truck hunting, and temperature control). The systems can also detect open doors or hatches and aid in fleet management by reporting if a car is not in its specified location. RailRider [TM] is a self-contained device with solar panels (for power), radio transmission antennas, and antennas for getting GPS location information in one "box," says John Felty, national sales manager-marketing for LatLon. Information is transmitted through a communication system called Microburst, which uses an AMPS-based cellular channel. Currently, more than 2,000 refrigerated cars are equipped with the systems. "We are now looking to the automotive area as an opportunity," Felty says. "There are significant savings to be had through preventative monitoring. And in terms of marketing, railroads can use such detectors to bring more freight back to rail. Customers will know that their shipments are delivered on schedule and in a way that is appropriate." RailRider [TM] also may be used on locomotives to monitor status, engine-run hours, location, and temperature.

Salient Systems

The Wheel Impact Load Detector system is the oldest wayside product in Salient's stable. It manages the wheel impact load spectrum for the targeted removal of defective wheels from service and protects rail infrastructure from potential damage. If a wheel generates a force that exceeds a customized alarm threshold, a report is created, identifying the wheel. A low-level alarm is sent to recommend car service at the next available opportunity; a mid-level alarm, to limit a train's maximum speed until that car can be removed; and a high-level alarm, to direct the train to stop as soon as possible to avoid potential derailment. In response to customer demand, Salient now offers Hunting Truck Detector and Automatic Vehicle Overload and Imbalance Detector options to purchasers of WILD, according to Dana Earl, the supplier's general manager. Salient's Truck Performance Detector monitors how well a vehicle's suspension system performs in a curve. In addition, the optical sensor of the Low Hose Detector focuses between cars to minimize false alarms.

StarTrack LLC

StarTrack's detection products have full-authority, two-way control, providing event information to car owners in real time. Customers specify, the events--temperature, fuel, unknown shutdowns--and an alarm message is sent immediately via email, fax, or page. They also can predict future failure modes. "With fault detectors, you add another level of visibility into the transportation cycle," says

Tim Slifkin. "Railroads can monitor functionality, detect chemical leaks, detect track anomalies, and measure general car health." Data is gathered and sent to a central service through whatever communication link is appropriate, according to Slifkin: cellular, satellite, radio frequency. ReeferTrak [R] monitors refrigeration equipment, as well as ride quality (longitudinal impacts, truck hunting, and vibrations). An optional feature is ReeferTrip [R], which allows an operator to override and restart refrigeration units via StarTrak's Web interface. HealthTrak [R] integrates multiple sensors and intelligence, such as GPS, movement, impact, acceleration, load, temperature, and pressure. TankTrak [R] is specifically designed for chemical, fuel, and hazardous-material shipments, and with the addition of a RideTrak [R] ride-quality sensor, railroads can be notified when cars are mishandled. The system sends location, g-force, and complete impact waveform in real time over the Internet.

The Timken Co.

This fall, Timken will test the Guardian [TM], a new wireless self-powered sensing system that mounts inside bearings to measure speed, temperature, and vibration, according to Mat Happach, president-rail at Timken. Using RF technology, performance data can be transmitted to a car-mounted receiver, which then passes it through an "intelligent interface" that communicates with the locomotive's computer system or outside network for analysis. According to Timken, "temperature is recorded at multiple locations inside the bearing for a clear indication of macro-bearing performance; a multi-axis accelerometer provides enhanced trending data that can track the onset of bearing degradation or the presence of a significant wheel phenomenon such as a wheel flat; a speed sensor is used to modulate the wireless transmission rates and can be used to diagnose certain operating characteristics such as stuck hand brakes; and a micro-generator powers the data acquisition, signal processing, and wireless transmission." The Guardian is a good option in terms of continuous monitoring, according to Dave Toth, Timken's chief engineer of rail, because bearing issues can develop in remote locations where there is inadequate hotbox-detector coverage.

Wabtec Railway Electronics

"Railroads are more often looking for improved predictability," says Mark Kramer, vice president-sales and marketing for Wabtec. To that end, the supplier offers the TRAIN TRAX [R] solid-state event recording system, which reports on train operation and provides auto-reporting of health information.

Wabtec's ERM (Engine Run Manager) system is currently in operation as part of CSXT's locomotive fuel-efficiency pilot, run in conjunction with the Maryland Department of Energy. According to CSXT's Greg Martin, 56 older locomotives (built pre-1990) are equipped with APUs (auxiliary power units). The APUs are used "to prevent an idling main engine from cooling down to where it is difficult to restart or requires an extended warmup period; to keep the brakes pressurized; to keep the batteries charged; and to keep the cab heated or cooled (depending on the season)," adds Glenn Foster, marketing manager. The ERM package is a comprehensive APU option that provides enhanced engine-health monitoring (collecting such data as horsepower, tractive effort, and temperature), backup APU shutdown and startup protection, main engine start capability, signal processing and data communication, and long-term record storage. Fault detection data can be communicated quickly over a wireless system to CSXT, according to Martin. Data stored in the ERM can be downloaded through a traditional cable download to a portable PC, or through CommLink, which transmits data over the 802.11 spread-spectrum network. CSXT started analyzing the program's data in July. "So far, the information is promising," Martin says, "and the technology is advanced enough to determine imminent failures and component performance in ways we never could before."

The future

As detector usage grows, planned maintenance and fleet management will get even easier with TTCI's InterRRIS [TM] system. This car performance database is designed to collect information from wayside detectors on North American railroads, providing industry-wide access to historical records of wheel, axle, truck, and train performance on a secure Website. Currently, the system is collecting data from more than 50 WILD and 14 TPD sites on UP, BNSF, Canadian National, and Canadian Pacific trackage. (CSXT and Norfolk Southern will soon add their detectors to the mix.) Onboard detector data is not yet filtered into InteRRIS [TM], but it may be in the future, according to TTCI's Irani. Because the data is car-centric--based on AEI tag information--participating railroads can track their cars across property lines, whether or not they own the wayside equipment. TTCI also allows private-car owners and locomotive manufacturers to track their rolling stock through a fee-based subscription.

"With a systemwide network that transfers data to InteRRIS [TM], all railroads and private-car owners will be able to improve their maintenance programs and determine what components work best on different parts of the railroad," says BNSF's Hill. "There's even potential for car redesign based on the best performing cars in operation."

Many railroaders agree that it will take time for every organization to develop confidence in detector equipment, but it's a worthwhile, cost-saving process.

"Detector systems are very reliable and have checks-and-balances built in, which is key," says UP's Beck. "The transportation group, the track engineering group, and the mechanical group at UP have come together to make use of the detector data. It benefits us all."